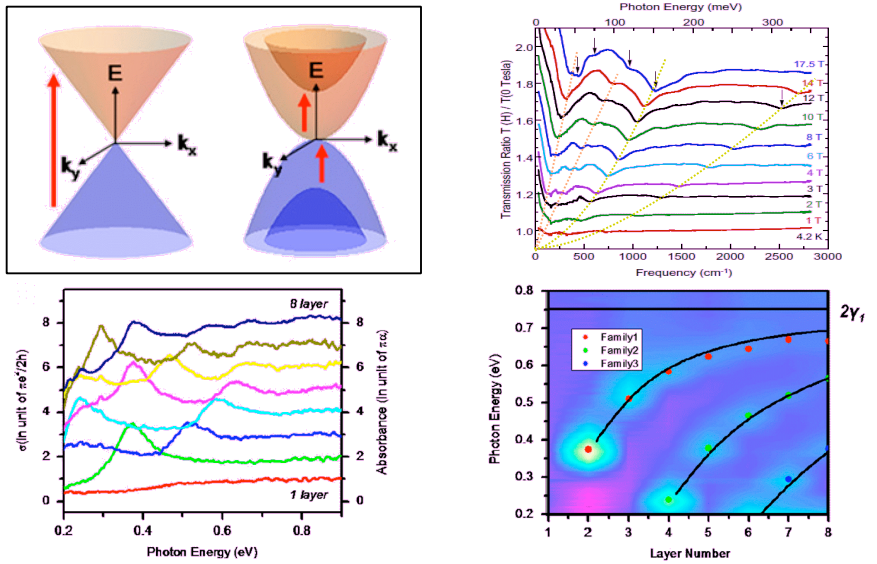
Magneto, Ellipsometric and Time-resolved IR (MET)

MET at NSLS-II

- Full infrared spectroscopic coverage for collective excitations, vibrations, and electronic transitions
- Ellipsometry for direct extraction of optical constants. Dielectric (ε) and magnetic (μ) response functions
- High-field magnet (sense orbital and spin degrees) and photo-excited time-resolved for dynamics

Examples of Science Areas & Impact

- CONDENSED MATTER: Interaction between electric and spin polarizations in multi-ferroics. Graphene band structure and E-field effects. Photoresponse in SWNTs. Band-gaps in novel superconductors. Electronic relaxation in semiconductors & superconductors. Contact-less transport characterization for synthetic metals & organics.
- ENGINEERED MATERIALS: Optical characterization of meta-materials for negative refractive inde.
- SUSTAINABLE ENERGY: Photoresponse in organic photovoltaics, electronic and vibrational excitations in thermoelectric cobaltates



Electronic structure of Few Layer Graphene (FLG) can have both massless (linear) and massive (parabolic) bands [upper left]. Far-IR magnetospectroscopy [upper right] reveals cyclotron resonance from both types of carriers (Liu et al, *New J. Phys* – in press) , while mid-IR spectroscopy [bottom panels] can directly sense the layer-by-layer evolution of interband transitions (Mak et al, *PNAS* 2010).

Beamline Capabilities

TECHNIQUE(S): infrared transmission, reflection and ellipsometric spectroscopies; cryo- and magneto-spectroscopy to 10T, pump-probe to ~10ps resolution

SOURCE: large gap dipole bend

ENERGY RANGE / RESOLUTION: 0.25 meV to 4 eV / 0.03 meV

U.S. DEPARTMENT OF ENERGY

Spokesperson: Larry Carr, Brookhaven National Laboratory

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